

Appendix 1

Preoperative management

B-ultrasound and computed tomography of the neck were performed before the surgery, and fine needle aspiration was performed in some cases. The laryngoscopy was performed before and after surgery to assess vocal cord mobility. Blood tests to evaluate thyroid function, intact parathyroid hormone (iPTH) levels, serum Ca^{2+} levels, and coagulation function. Patients diagnosed with hyperthyroidism received antithyroid drugs for symptom control, followed by a 3-week course of compound solution of iodine orally.

Surgical procedure (ETAA)

Working space

After endotracheal intubation under general anesthesia, the patient was positioned supine with all limbs abducted. Cushions were utilized to elevate the shoulders and slightly extend the neck. The patient underwent standard sterile prepping and draping. The surgeon assumed a position between the patient's legs while assistants stood on either side of the neck. Subcutaneous injection of an "inflation liquid" consisting of one mg adrenaline mixed with 500 mL saline was administered at the medial edge of the right areola. A curved incision measuring 12 mm in length was made based on two to four points along the areolar edge, followed by subcutaneous injection of approximately 50–100 mL "inflation liquid" into the deep fascia below the suprasternal notch using a water injector. A subcutaneous separation stick created a dissection plane from deep fascial layers toward the suprasternal notch through this incision site. Excess fluid was subsequently suctioned out after the formation of a subcutaneous tunnel. A trocar with an inner diameter measuring 10 mm was inserted, accompanied by a 10 mm, 30° laparoscope for visualization purposes. CO_2 pressure remained constant at six mmHg throughout the

surgery.

At positions corresponding to 11 o'clock on both the left and right edges of the areola, a 5-mm trocar served as the primary and auxiliary operation ports. An ultrasonic scalpel and toothless graspers were introduced via these ports, respectively; specifically, the ultrasonic scalpel facilitated separation superiorly up to the upper border of cricoid cartilage within loose connective tissues beneath sternohyoid muscles' superficial layer extending laterally towards midline sternocleidomastoid muscle's deep layer.

Thyroidectomy

The midline of the infrahyoid muscles was opened using an ultrasonic scalpel. Following the separation of the infrahyoid muscles and thyroid capsule, a suture was placed within the working space with its tail left outside the operative field. Subsequently, we sutured the muscle layers beneath the hyoid bone while keeping the head of the suture outside the working space. This allowed the suspension of the muscles to facilitate exposure of the thyroid gland by pulling on these sutures externally. Initially, using an ultrasonic scalpel, we separated and excised the isthmus from the trachea. Blunt dissection with endoscopic forceps enabled exposure of lower pole structures in the thyroid through which inferior thyroid arteries and veins were resected. Retraction superiorly and medially facilitated cutting Berry's ligament and middle thyroid vein using an ultrasonic scalpel while partially exposing (or not) recurrent laryngeal nerve (RLN) to identify its position and course via blunt dissection.

Further inferior retraction exposed superior thyroid arteries that were resected using an ultrasonic scalpel. Finally, lobes were excised following a similar procedure on the contralateral side. All excised tissues were collected in a specimen bag, removed through an observation port, and sent for intraoperative frozen pathology.

See our previous study for more details about ETAA [Wang *et al.* (14)].